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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Blakely, Sokoloff, Taylor & Zafman LLP  
Seventh Floor  
12400 Wilshire Boulevard  
Los Angeles, CA 90025-1030

EXAMINER

PATEL, ISHWARBHAI B

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/075,513

Applicant(s)

CHIU, CHIA-PIN

Examiner

Ishwar (I. B.) Patel

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 3,8,12 and 16-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-7,9-11,13-15 and 23-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-15 and 23-25, drawn to a circuit board with electronic component, classified in class 174, subclass 260.
- II. Claims 16-22, drawn to a method of manufacturing a circuit board, classified in class 29, subclass 832.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process such the product does not need the steps of aligning the electrical contacts of the electronic component or the step of compressing the solder ball.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

4. This application contains claims directed to the following patentably distinct species of the claimed invention:

Specie I                      electrical contact of the component are pins.

Specie II                     electrical contact of the component is solder ball.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claim is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record

showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

5. During a telephone conversation with Jordan M. Baker (39,602) on February 26, 2003, a provisional election was made with traverse to prosecute the invention of a circuit board and circuit board with electronic component, claim 1-15 and 23-25, and specie II, with solder ball contact, claims 1-2, 4-7, 9-11, 13-15 and 23-25. Affirmation of this election must be made by applicant in replying to this Office action. Claims 3, 8, 12 and 16-22 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### ***Drawings***

6. The drawings are objected to because the figures are improperly cross hatched. All of the parts shown, and only those parts, must be cross hatched. The cross hatching patterns should be selected from those shown on page 600-114/115 of the MPEP based on the material of the parts. See also 37 CFR 1.84(h)(3) and MPEP 608.02.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 2-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 2, the applicant is claiming the electrically conductive material is to receive an electrical contact of an electronic component, but the component is not claimed.

Claim 2 depends on claim 1 and the electrical conductive material is already claimed in claim 1. So, it is not clear what additional structural limitation is added in claim 2, which make the conductive material suitable for receiving the electrical contact of an electronic component.

Regarding claim 3 and 4, the applicant is further claiming the electrical contact of the component as pin in claim 3 and as solder ball in claim 4, but the component is not claimed.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Crotzer et al., US Patent No. 5,949,029, hereafter, Crotzer.

Regarding claim 1, Crotzer discloses a circuit board comprising:

a substrate (substrate 72, see figure 8, column 7, line 43-52);

a plurality of through holes in the substrate (array of opening 78, see figure 8, column 7, line 43-52); and

a malleable, electrically conductive material filled within each of the through hole (conductive interconnect element 74, see figure 8, column 7, line 43-52).

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crotzer et al., US Patent No. 5,949,029, hereafter, Crotzer as applied to claim 1 above, and further in view of Glenn, US Patent NO. 6,441,485.

Regarding claim 2, though circuit board of Crotzer is not disclosing any component on the substrate, it is known in the art as further disclosed by Crotzer, column 7, line 45-52 and as disclosed by Glenn to install a component on the circuit board for the desired functionality of the electronic system.

Therefore, it would have been obvious to one having ordinary skill in the art the time the invention was made to provide the substrate with a component, as taught by Glenn, in order to have the desired functionality of the electronic system.

Regarding claim 4, the modified assembly of Crotzer further discloses the electrical contact as solder balls, see Glenn, figure 2.

Regarding claim 5, the modified assembly of Crotzer further discloses the material as an elastomer; see Crotzer – column 7, line 52-62.



13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Crotzer et al., US Patent No. 5,949,029, hereafter, Crotzer and Glenn, US Patent NO. 6,441,485, as applied to claims 1-2,4-5 above, and further in view of Credle et al., US Patent No. 5,340,947.

Regarding claim 6, though the modified assembly of Crotzer is not disclosing the tapered through holes, such tapered through holes, as disclosed by Credle, is known in the art and are used depending upon specific situation. Tapered through holes are easy to drill by laser drill method and also will be convenient to fill the conductive material into the holes, without any void. If the thickness is large compared to the diameter, the taper may be provided from both the ends to fill the material without any void.

Therefore, it would have been obvious to one having ordinary skill in the art the time the invention was made to provide the substrate of Crotzer with taper through hole, as taught by Credle, in order to have the vias without any voids.

14. Claims 7, 9-11, 13-15 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combinations of Crotzer et al., US Patent No. 5,949,029, hereafter, Crotzer, Glenn, US Patent NO. 6,441,485, and Credle et al., US Patent No. 5,340,947 as applied to claims 1-2 and 4-6 above.

Regarding claims 7, 11 and 23, the combination of Crotzer, Glenn and Credle, discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the tapered through holes / coupling means.

Regarding claims 9 and 13, the combination of Crotzer, Glenn and Credle discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the solder balls that compresses the elastomer when the electronic component is coupled to the circuit board, see Glen figure 2.

Regarding claims 10 and 15, the combination of Crotzer, Glenn and Credle discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the conductive particles; see Crotzer – column 7, line 53-62.

Regarding claim 14, the combination of Crotzer, Glenn and Credle discloses all the features of the claimed invention including the fastener, see Glenn figure 2.

Regarding claims 24 and 25, the combination of Crotzer, Glenn and Credle discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the through holes and the through holes filled with elastomer, see Crotzer, column 7, line 42-62.

***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Fujimura discloses an assembly with removably coupling an electronic component.

Moore discloses conductive elastomer / conductive rubber into the holes for electrical connections.

Kawakami et al., (two patents) disclose conductive paste into the holes for interconnections.

Buchoff et al., disclose conductive elastomers for interconnections.

Hopfer, III et al., disclose resiliently waded conductor for the interconnections.

Lloyd discloses a conductive adhesive consisting of resin impregnated with silver.

Neftin et al., and Oka et al., disclose tapered via.

Dolbear, discloses apparatus with clamping devices.

Gates et al., disclose compliant interconnect assembly with solder ball.


Gilleo et al., disclose a microelectronic component with conductive flexible shell into the holes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (8:30 - 5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L Talbott can be reached on (703) 305 9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp  
March 8, 2003

  
KAMAND CUNEO  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800